Brno University of Technology

Central European Institute of Technology BUT

Supervisor´s report

Academic year: **2020/2021**

Student: **Ing. Martin Hrtoň**

Doctoral programme: Advanced materials and nanosciences

Field of study**: Advanced nanotechnologies and microtechnologies**

Supervisor: **prof. RNDr. Tomáš Šikola, CSc.**

Name of doctoral thesis topic: Semianalytical approach to simulations in nanophotonics

Overall evaluation of doctoral thesis and study of the doctoral student :

The PhD student, Martin Hrtoň, has met all the tasks of his PhD study. He has successfully utilised his previous knowledge and skills acquired during his master's studies in the field of plasmonics and nanophotonics, and improve them to an outstanding level in the following PhD study.
Martin has developed an original computational tool combining analytical and numerical approaches enabling more quickly to calculate a distribution of magnetic (and electric) components of electromagnetic near fields in the vicinity of plasmonic (diabolo) antenna arrays. In this way, it was possible to test resonant properties of larger antenna arrays in a reasonable time. On top of that, he has developed a model of interaction of magnetic near-field generated by these antennas with EPR (Electron Paramagnetic Resonance) active materials. Consequently, all these tools have been successfully applied in simulations of signal response of Plasmon Enhanced EPR, a unique analytical microscopic method proposed by an international consortium supervised by PhD's supervisor and having been part of a prestigious H2020 FET project PETER.
He has also utilized his knowledge in simulations and modelling of formation of optical beams by metasurfaces and significantly contributed to several publication in high-profile journals of the group.
Martin is a talented, quite independent and responsible student. He is a valuable member of our research team participating in theoretical issues of our research problems. He is supposed to stay in the team even after his PhD studies and to continue in his professional carrier there.

Conditioned by successful defence of his PhD thesis, I recommend the commission to award the student a PhD degree.

Brno, August 2, 2021 …….